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(54) Vehicle jack.

(57) The jack is of the type having a leg (11) provided with rolling base (13), or pivoted to a base, an arm (20) pivoted to the leg, a load-support shoe (30) on the arm and a screw (23) and nut (24) arrangement for pivotally moving the arm relative to the leg. The load-support shoe may be mounted on further links attached to the arm and the leg in a parallel-

ogram arrangement. In order to position the jack correctly in different setting-up positions, an auxiliary foot (40) is provided. The foot is geared to the arm (20) by meshed teeth (44,48), so that the auxiliary foot is automatically adjusted relative to the base as the arm is pivotally moved relative to the leg.

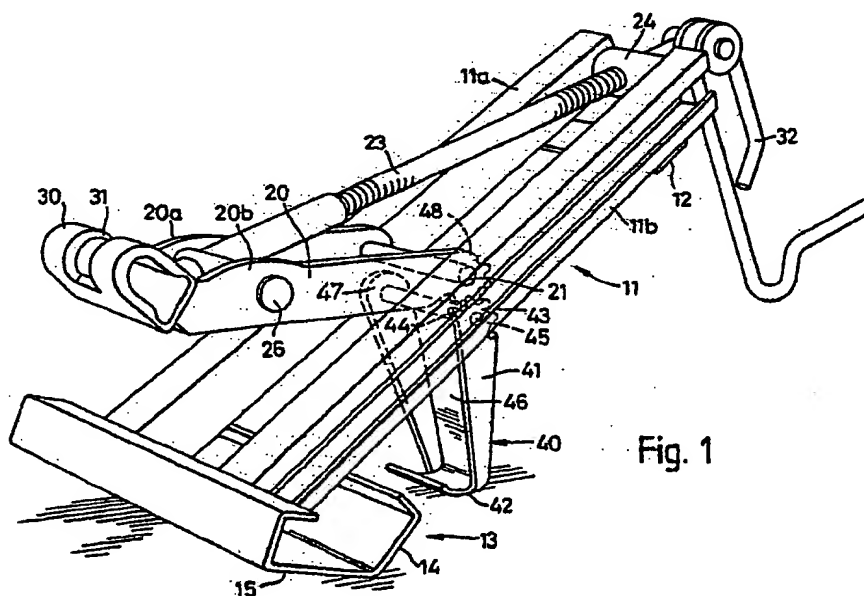


Fig. 1

EP 0 396 233 A1

This invention relates to Vehicle Jacks.

It is well known to produce jacks of the type having a main leg pivotted to a base, or provided with a rolling base, and having an arm pivotted to the leg and carrying a shoe for engaging a load-point on a vehicle. A screw is mounted between the leg and the arm for angularly moving them relatively, so as to effect lift.

A jack of this type, with a rolling base, is known from GB-A-2053846. This type of jack has gained favour, because it is cheap to produce and can easily be stowed in a vehicle, or even in a spare wheel. One embodiment (Fig.4) of this jack also has an extension of the arm projecting to the opposite side of the leg for supporting the jack at the beginning of a lifting operation, but this is too short to be effective. GB-A-1011933 discloses a similar type of jack with a rolling base and a much longer extension. This makes it easier to position the jack properly and more safely irrespective of whether the adjacent tyre is inflated or deflated. The extension has no function during lift and is raised off the ground. This arrangement has the disadvantage that it is very bulky and difficult to stow.

GB A-2114537 discloses a similar jack, with its leg pivotted to a base, in which the extension is formed with a crank defining an auxiliary foot. This arrangement also positions the jack properly at the beginning of a lifting operation and is less bulky than that of GB-A-1011933. The jack is still much more bulky and difficult to stow, however, than the jack shown in GB-A-2053846. To facilitate stowage, the base can be detached, but this is an inconvenient arrangement and, even without the base, the jack remains bulky.

DE-A-2427443 discloses a similar type of jack in which the extension is pivotally mounted relative to the arm, so that stowage is facilitated. It is, however, necessary to manoeuvre the extension in setting up the jack and the loosely pivotted extension is inconvenient for handling.

DE-A-2621425 discloses an embodiment in which an additional link is provided between the base and the arm, being pivotted to both. This is an expensive arrangement which provides no assistance in stabilising the jack at the initiation of a jacking operation.

Another embodiment provides a sliding auxiliary foot, which again provides little assistance in setting up the jack. A control arrangement on the arm extends the arm as the jack moves to a lifting position. This arrangement is also expensive to manufacture and suffers from substantial frictional resistance to sliding movement.

US-A-4720081 also discloses arrangements with extra links between the base and the arm.

FR-A-2353480 discloses a pivotted auxiliary

foot which is controlled by a cam on the arm which engages a slide provided between the cam and the auxiliary foot. A further cam arrangement is provided to interconnect the slide and the foot. This is again a complex arrangement which is expensive to manufacture and has problems of frictional resistance.

DE-A-3712237 discloses an auxiliary foot fixed to the leg, so that it defines only a single setting up position for the jack and cannot be adjusted to accommodate a variable gap between the ground and the engagement point of a vehicle.

EP-A-0097558 discloses an auxiliary foot which is pivotally mounted on the leg and has control means in the form of an extension which bears against the underside of the arm. A torsion spring biases the extension into bearing contact with the arm. This arrangement provides for a variable setting up position of the auxiliary foot under the control of the arm and avoids most of the problems of the prior art referred to previously. The auxiliary foot extends at an angle to the arm, which angle varies according to the position of the arm, so that the foot can be short, but effectively positioned.

This arrangement also has the disadvantage that a sliding bearing surface has to be provided, or there will be high frictional resistance and damage to paintwork on the arm. There is also a danger of the operator trapping a hand between the foot extension and the arm.

The present invention provides a jack which has the advantages of the jack of EP-A-0097558 without the disadvantages and with the easy stowability of the jack of GB-A-2053846. The present invention permits the design to be such that the foot is correctly positioned whatever the loading of the vehicle, or with the wheel to be replaced having an inflated tyre, or deflated tyre. Correct positioning is important with this type of jack to ensure stability.

The pre-characterising part of Claim 1 is based on EP-A-0097558 and the invention is characterised in that the control means between the arm and the foot, providing for angular movement of the foot under the control of the arm, comprises gearing interconnecting the arm and the foot.

The ratio of the gearing can be pre-determined to provide optimum positioning of the foot in setting up the jack for different states of the vehicle.

Reference is now made to the accompanying drawings, wherein:-

Figure 1 is a perspective view of a jack according to the invention;

Figure 2 is a side elevation of the jack of Figure 1 in a setting up position;

Figure 3 is a side elevation of the jack of Figure 1 in a load-supporting position; and

Figure 4 is a side elevation of the jack of

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Figure 1 in a stowed position.

The jack shown comprises a main leg (11) comprising two spaced, parallel members (11a, 11b) secured together, near upper ends, by a brace (12) and, at lower ends, by a base (13). The base is of a "rolling" type having a setting-up surface (14) and relatively angled main support surface (15). In use, during a lifting operation, the jack rolls from initial support on the setting-up surface to support on the main support surface.

A channel-shaped arm (20) extends between the leg members (11a, 11b) and is pivotally mounted to the members, adjacent one end of the arm, by a pivot pin (21). The arm extends almost wholly between the members in the stowed position (Figure 4) of the jack and is angularly movable from this position relative to the leg about the axis of the pivot pin (21) towards an operative position, projecting to one side of the leg (11). This movement is effected by means of a screw (23).

A nut (24) is pivotally mounted between the leg members (11a, 11b) by trunnions (25) (Figure 2) and a pivot member (26) is pivotally mounted in the channel of the arm (20) between the sides (20a, 20b) of the channel in apertures in the sides. The screw (23) extends radially through the pivot member (26) and terminates in a head (27). A bearing race (28) is mounted on the screw (23) between the head (27) and the pivot member (26).

The screw (23) screw-engages in the nut (24) and extends therethrough, a handle (32) being mounted on the end of the screw.

A shoe (30) is mounted on the upper end of the arm (20) and has a slot (31). The shoe is designed to engage with a load point on a vehicle and may have a varying construction.

In operation, the handle (32) is turned to rotate the screw (23), so that the arm (20) is moved angularly relative to the leg (11). The jack is set up with shoe (30) engaged with the load point of a vehicle and the jack is supported on the setting-up surface (14). As the load on the jack increases, the jack pivots so as to be supported on the support surface (15), with the leg substantially upright, as shown in Figure 3.

An auxiliary foot (40) is provided for supporting the jack in its setting-up position. The foot is angularly adjustable relative to the leg (11) so as to position the foot in an optimum position for setting up the jack irrespective of the height of the shoe (30) above the base (13) in the setting-up position. The foot is also angularly movable to a stowed position generally parallel to the leg as shown in Figure 4. Means is provided to move the foot automatically as the jack is operated.

The foot (40) is a one piece metal pressing and has an elongate body (41) of channel form with a main portion (46) and an integral base (42) at one

end of the body. The channel sides terminate at the opposite end to the base in spaced heads (43, 47), one of which (43) has an arcuate rack of teeth (44). The foot is located between the leg members with the geared head (43) adjacent one leg member (11b) and the non-geared head (47) adjacent the other leg member (11a). The heads are pivotally mounted on the leg members by a pin (45), the teeth (44) being co-axial with the pin (45) axis.

One of the channel sides (20b) of the arm (20) is provided with an arcuate row of teeth (48) co-axial with the pivot pin (21) which mounts the arm on the leg. The teeth (48) of the arm mesh with the teeth (44) of the geared head (43) of the foot (40).

This arrangement means that the foot is forced, by the meshed teeth to move angularly relative to the base (13) as the arm is angularly moved to place the jack in a setting-up position. Conversely, as the arm is moved to the stowed position, the foot is automatically moved to its stowed position in which the jack is very compact for storage. The ratio of the gearing can be pre-determined to provide optimum setting-up positions of the foot relative to the base (13).

In a modification, the jack is designed with additional links attached to the arm and the main leg in a parallelogram arrangement with the arm and the leg, for example, as shown in GB-B-2 030 108. The shoe (30) is then indirectly carried by the arm (20) and may be mounted on either of the links, or on both of the links, e.g. in the manner shown in GB-B-2 152 474.

Claims

1. A vehicle jack having a leg (11) provided with a base (13) and arranged so that the leg moves angularly during a lifting operation, an arm (20) pivoted to the leg, the arm supporting means (30) for engaging a load-point on a vehicle, a screw (23) extending between the arm and the leg whereby the screw can be turned to move the arm angularly relative to the leg to effect lift, and an auxiliary foot (40) for supporting the jack at the initiation of a lifting operation, the auxiliary foot being pivotally mounted on the leg for angular movement relative to the base (13), and control means (44,48) provided between the arm (20) and the foot (40), whereby said angular movement of the foot is controlled by the arm, and the foot is caused to move angularly towards a supporting position as the arm is angularly moved towards an operative position, characterised in that said control means comprises gearing (44,48) interconnecting the arm (20) and the auxiliary foot (40).

2. A vehicle jack according to Claim 1, wherein the arm (20) is of channel shape and has a side

the channel formed at one end with an arcuate row of teeth (48) concentric with the pivot axis (21) of the arm (20) on the leg (11) and meshed with teeth (44) on the auxiliary foot to provide said gearing.

3. A vehicle jack according to Claim 1 or 2, wherein the auxiliary foot (40) comprises an elongate metal pressing formed at one end with an arcuate row of teeth (44) meshed with teeth (48) on the arm (20).

4. A vehicle jack according to Claim 3, wherein the auxiliary foot (40) has a base (42), at the opposite end to said teeth (44) of the foot, for engaging the ground.

5. A vehicle jack according to Claim 1, 2, 3 or 4, wherein a pair of spaced legs (11a, 11b) is provided with the arm (20) pivotally mounted therebetween, and the auxiliary foot (40) is located between the legs and pivotally mounted on at least one of the legs.

6. A vehicle jack according to any preceding claim, wherein the means (30), for engaging a load-point on a vehicle, is mounted directly on the arm (20).

7. A vehicle jack according to any one of claims 1 to 5 including additional links pivotally mounted on the arm (20) and the leg (11) in a parallelogram arrangement, the means (30), for engaging a load-point on a vehicle, being mounted on at least one of said links.

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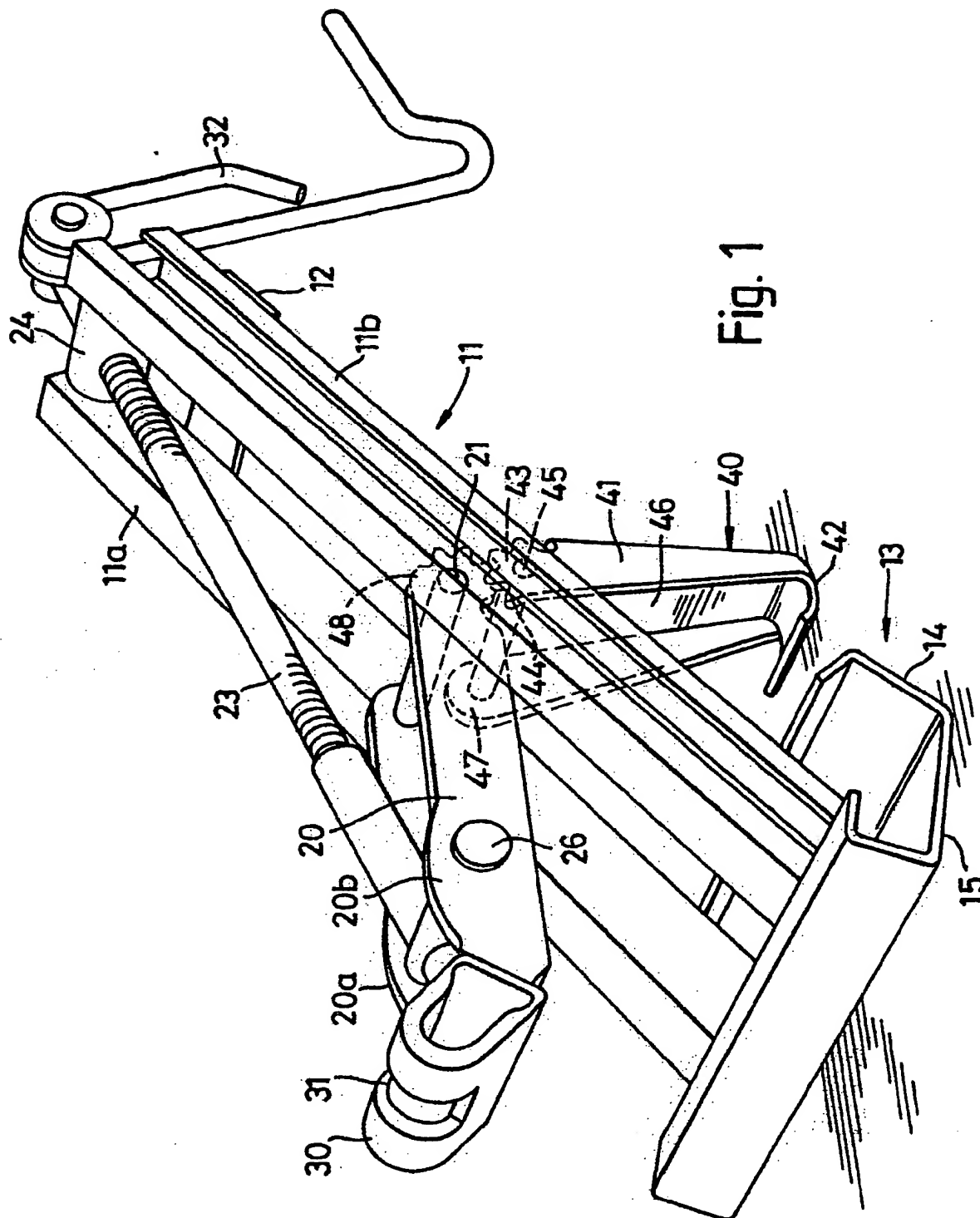
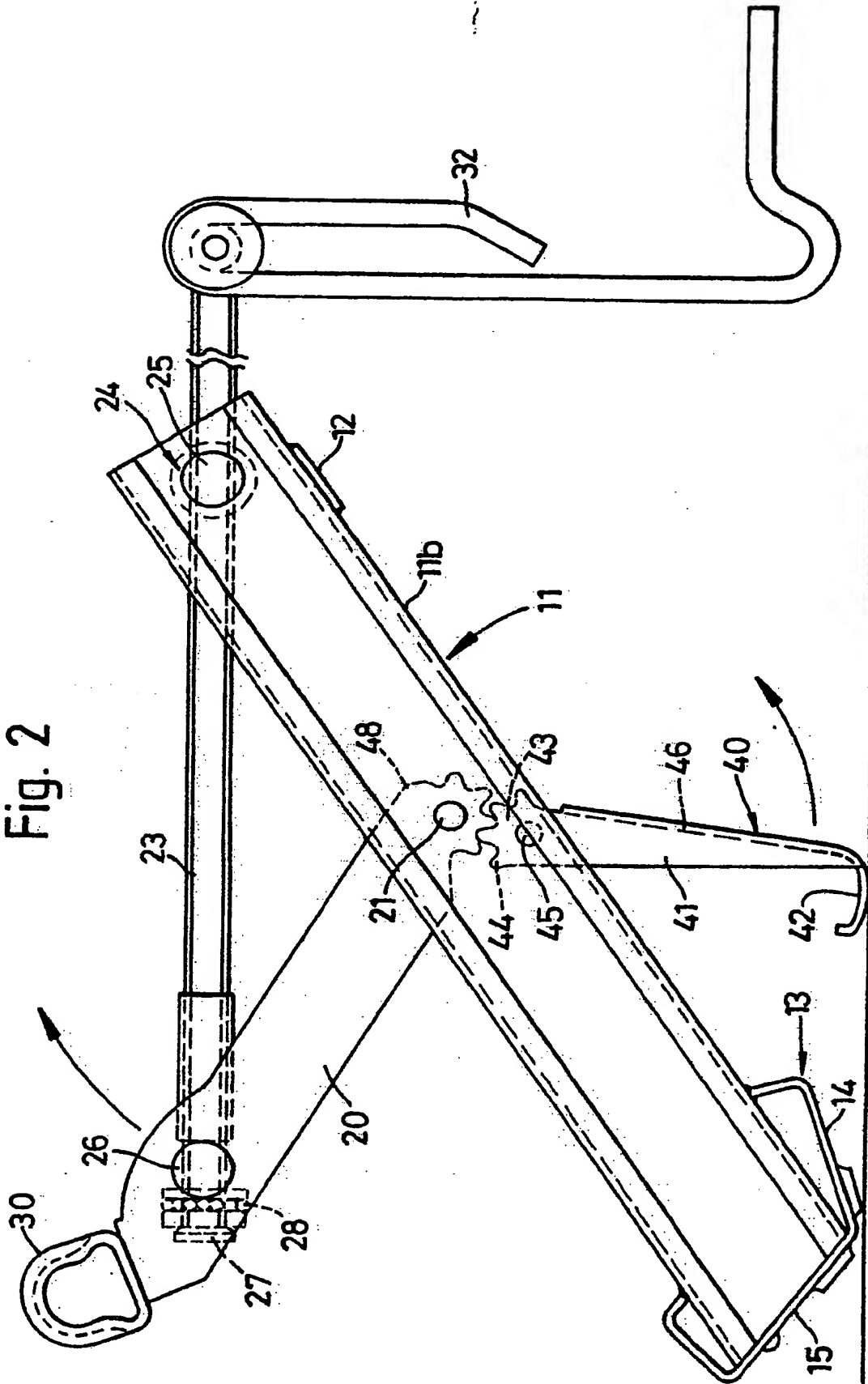
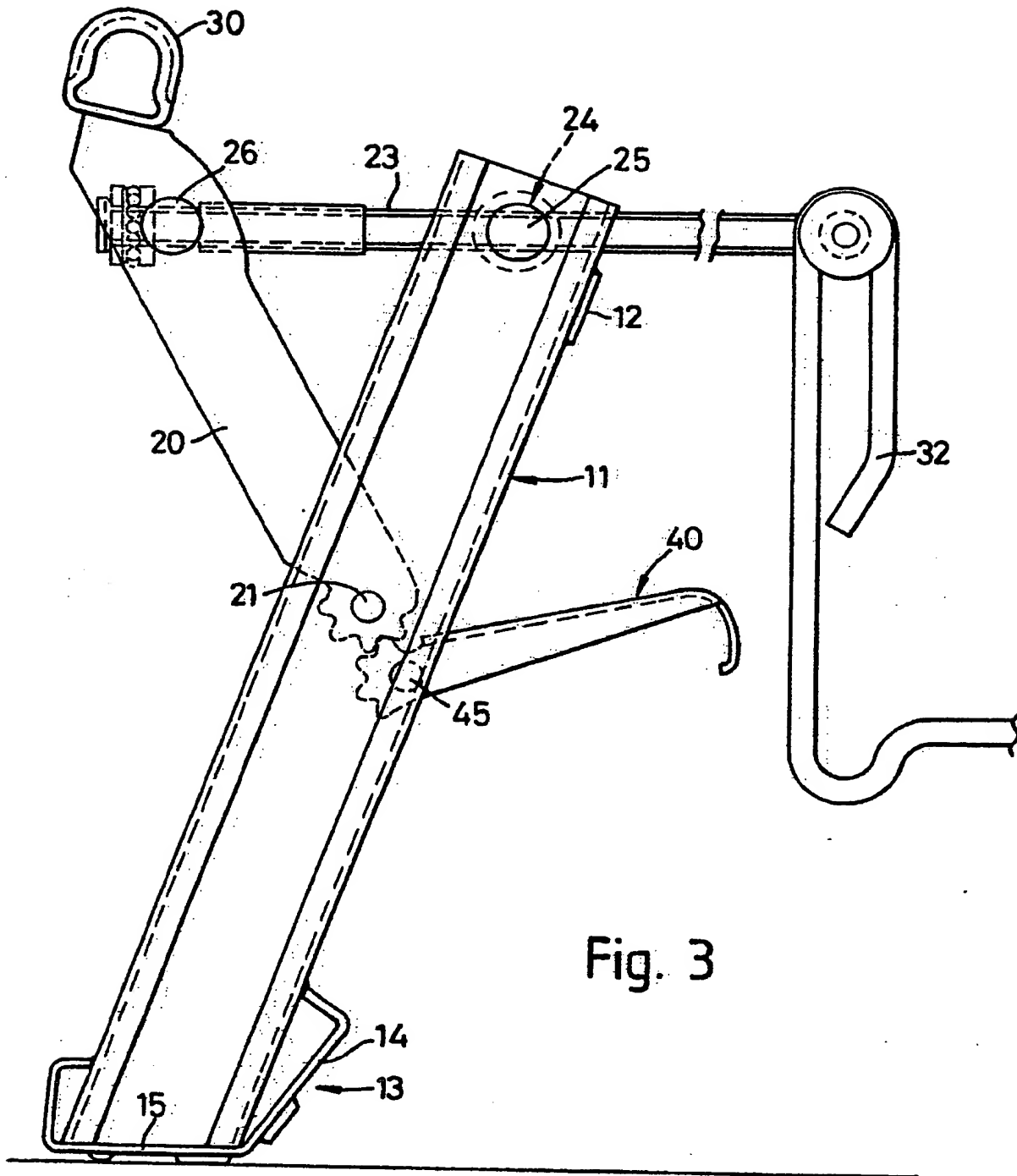


Fig. 1

Fig. 2







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EUROPEAN SEARCH REPORT

Application Number

EP 90 30 2629

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A, D	DE-A-2 427 443 (Fa. AUGUST BILSTEIN) * Page 8, paragraph 3; page 12, paragraph 2 *	1	B 66 F 3/12
A, D	DE-A-2 621 425 (ALLENDORFER FABRIK FUR STAHLVERARBEITUNG ING. HERBERT PANNE)		
A, D	FR-A-2 353 480 (FIRME AUGUST BILSTEIN)		
A, D	EP-A-0 097 558 (AUTOMOBILES PEUGEOT)		
A, D	DE-A-3 712 237 (AUDI AG)		
A, D	US-A-4 720 081 (EXNER)		
A, D	GB-A-2 114 537 (CARTER)		
A, D	GB-A-2 053 846 (METALLIFACTURE)		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B 66 F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 11-07-1990	Examiner VAN DEN BERGHE E.J.J.
CATEGORY OF CITED DOCUMENTS			
<p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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